Oct. 26, 1943. H. C. BOLLEY 2,332,554

ELECTRIC SWITCH

Filed Oct. 3, 1940

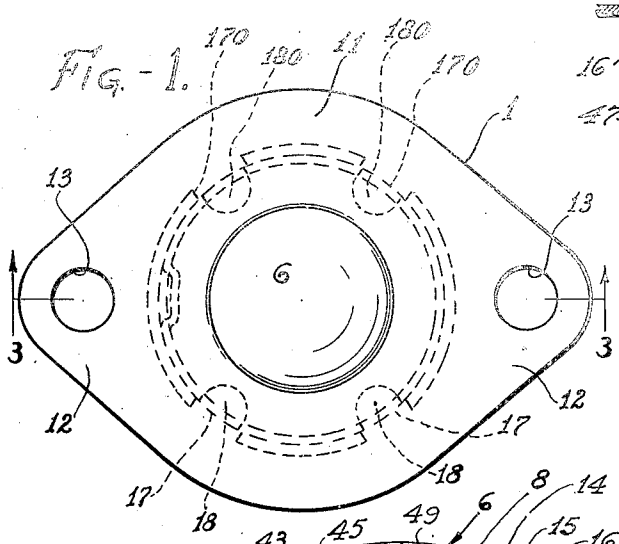


FIG. - 1.

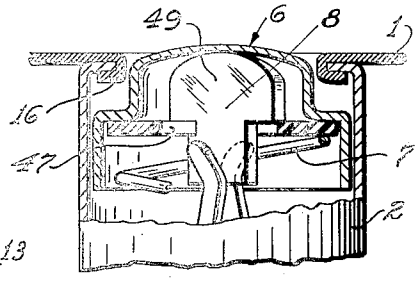


FIG. - 2.

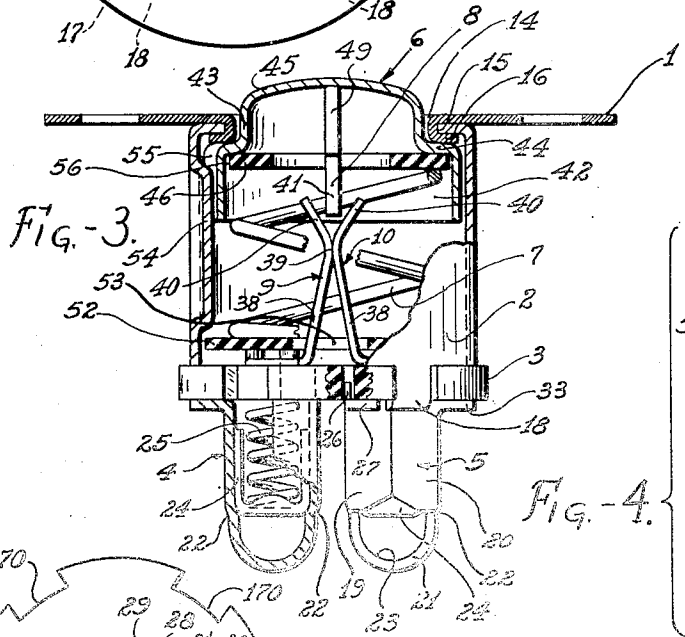
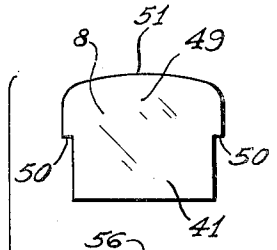


FIG. - 3.



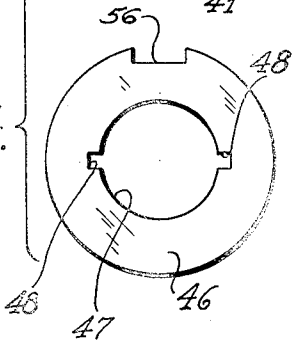


FIG. - 4.

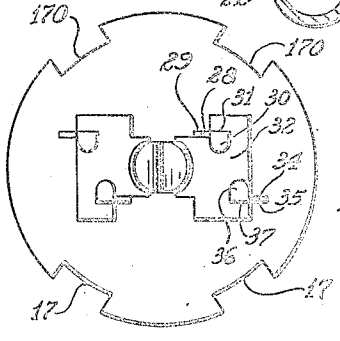


FIG. - 5.

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Patented Oct. 26, 1943 2,332,554

UNITED STATES PATENT OFFICE

2,332,554

ELECTRIC SWITCH

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Application October 3, 1940, Serial No. 359,540

7 Claims. (Cl. 200—159)

This invention relates generally to electric switches and primarily to a switch of the push button type.

One object of the invention is to provide an electric switch which is very positive in action both mechanically and electrically.

Another object is to provide a switch consisting of very few parts which may be easily and quickly assembled, and one which can be economically manufactured.

A further object is to provide a switch having moveable contacts with improved means for securing same to the terminal posts carried by the switch.

A still further object is to provide improved means in conjunction with the push button for engaging the contacts above referred to to operate the switch.

Other objects and advantages of the invention will be apparent after reading the description hereinafter set forth in conjunction with the drawing annexed hereto.

Referring to the drawing:

Figure 1 is an enlarged top plan view of the switch;

Figure 2 is an upstanding view partially in section of a part of the switch showing same in operative position;

Figure 3 is an elevational view of the switch taken substantially on line 3—3 of Figure 1, portions of which are shown in section;

Figure 4 clearly shows the construction of the improved actuating means associated with the push button; and

Figure 5 is a top plan view of the carrier, with the switch casing removed in order to clearly show the manner in which the moveable contacts and terminal posts are secured to the carrier.

The switch, among other things, includes a mounting plate 1 to which is secured a substantially cylindrical tubular casing 2. One extremity of the casing is provided with a contact carrier 3 which carries a plurality of terminal posts generally designated 4 and 5. The opposite extremity of the casing which is secured to the plate is provided with an operating means in the form of a push button generally designated 6, which is normally maintained in the extended position shown in Figure 3 by a helical spring 7 arranged within the casing. When the push button 6 is projected inwardly against the force of the spring, the actuating means 8 carried by the button is so constructed and arranged that same will separate the yieldable or moveable contacts generally designated 9 and 10 to open an electric circuit.

The switch just described may be mounted as desired, but is preferably adapted to be mounted or seated within a recess in a door casing with the push button 6 exposed for operation by the door, which when closed and opened will turn the switch "on" and "off" to operate some electrical apparatus, or illuminate a lamp such as the dome lamp in an automobile.

Referring more specifically to the construction of the mounting plate 1, same includes a generally circular central portion 11, and portions 12 which are continuations of the portion 11. These portions 12 are preferably arranged diametrically opposite each other in the same plane as the central portion, and provide ears having apertures 13 through which means such as screws may be extended for securing the switch to a suitable support. The central portion of the plate is provided with a relatively large aperture 14, and the end wall of the switch casing 2 is provided with a relatively large central circular aperture 15. The casing 2 is preferably secured to the mounting plate by providing the aperture in the plate with a tubular extension which projects through the aperture 15 of the casing, and is bent outwardly against the end wall of the casing as indicated at 16. Thus, a good mechanical connection is provided between the mounting plate and the casing, and one which enhances the frontal appearance of the switch. Obviously, the casing and plate may be otherwise satisfactorily secured together.

The principles of design and construction embodied in the contact carrier 3 and electrical contacts and parts secured thereto will now be described. The carrier is preferably made in the form of an annular disc of a size sufficient to close off one extremity of the casing. The periphery of the carrier is preferably provided with a pair of notches 17 and a pair of notches 170 as clearly shown in Figure 5, which are adapted to receive a pair of locking fingers 18, and a pair of locking fingers 180, respectively, formed on the switch casing, which fingers are adapted to be bent over against the outer surface of the carrier to firmly secure the carrier in place, as clearly shown in Figures 1 and 3. The pairs of notches and fingers are preferably so constructed and arranged that the carrier can be assembled with the casing in two positions, but only in one position with respect to the actuator 8 carried by the push button 6. To explain this further, the carrier 3 may be assembled with

the casing so that pairs of locking fingers will be positioned in the notches as illustrated in the Figures 1 and 3 or, if found desirable, the carrier may be assembled so that the pairs of locking fingers 18 and 180 will fit within the pairs of notches 170 and 17, respectively; and in either of these positions the yieldable contacts 9 and 10 will be arranged in one predetermined position for separation by the actuating means 8 carried by the push button.

Considering now the terminal posts generally designated 4 and 5, it will be noted that both posts are substantially identical in construction, and accordingly, it is believed that a description of one will be sufficient. The posts may be of conventional form, but as herein shown, they are of a character whereby they will receive and detachably retain plug conductor terminals of the snap type. The post 5, as clearly shown in Figure 3, includes a substantially rectangular channel portion 19, and a similar portion 20 which are pressed together to form a tubular body substantially square or rectangular in cross-section. The channel portions are connected together by a substantially semi-cylindrical or arcuate portion 21, the extremities of which connect with the base of each channel portion to provide abutments 22. The arcuate portion 21 provides an aperture 23 adapted to receive the plug conductor terminal. A substantially U-shaped detent member 24 is reciprocably arranged in the tubular post, and is urged outwardly by a helical spring 25 to normally engage the abutments 22 to maintain the detent in a predetermined relation with respect to the terminal aperture 23, so as to present a device capable of taking and holding a plug conductor terminal by merely inserting same into the aperture. As shown, the greater portion of the helical spring 25 is arranged within the detent 24, with one end of the spring engaging the base of the detent and its other the outer surface of the carrier 3.

The base of the channel portion 19 of the terminal post 5 is provided with a continuation 26 which fits in an aperture provided therefor in the carrier 3, as clearly shown in Figure 3. One wall of said channel 19 is provided with an outwardly extending foot portion 27 which engages the outer face of the carrier. The opposite wall of the channel 19 is provided with an extension 28 which projects through an aperture 29 provided therefor in the carrier 3, as clearly shown in Figure 5. The extension 28 is provided with a tab 30 which extends through a notch 31 formed in the flat base portion 32 of the yieldable contact generally designated 10, and is bent over on the base to assist in holding said contact in the position shown.

The base of the channel portion 20 of post 5 is provided with an outwardly extending foot portion 33 which engages the outer surface of the carrier 3 in the same manner as the foot 27. One wall of the channel 20 is provided with a foot (not shown) which is similar to the foot 27. The opposite wall of the channel 20 is provided with an extension 34 which projects through an aperture 35 provided therefor in the carrier 3, and this extension is provided with a tab 36, similar to the tab 30, which fits in a notch 37 formed in the base 32 of contact 10, and is bent over and upon the base in a direction toward the tab 30, to further assist in securing the contact firmly in place. Obviously, the post 4 and contact 9 are secured to the carrier in substantially the same manner. Thus, the stationary terminal posts 4 and 5 and the moveable contacts 9 and 10 are firmly anchored to the carrier 3 and insulated from the remainder of the switch. It will be apparent that the inner extremities of the terminal posts and the yieldable contacts, and the carrier 3 are so constructed that the posts 4 and 5 are interchangeable with the apertures provided in the carrier 3, and that the position of the moveable contacts 9 and 10 may be reversed without, in any way, affecting the operation of the switch. To explain further, the contact 9 may be secured to the post 5 and the contact 10 to post 4.

The moveable contacts 9 and 10 are rather elongated, as clearly shown in Figure 3, and when firmly secured to the carrier normally engage each other so that current may pass from one post through the contacts 9 and 10 to the other post to normally maintain an electric circuit closed. Specifically, the moveable contacts 9 and 10 are arranged generally along the longitudinal axis of the switch, and include relatively long converging portions 38 which contact at 39, and portions 40 which diverge, in order to present a substantially V-shaped trough adapted to be engaged by the inner extremity 41 of the actuator 8 when the push button is pressed inwardly.

The construction of the push button 6 and the actuator 8 carried thereby will now be described. The push button 6 preferably includes a substantially tubular cylindrical portion 42 arranged within the casing, and a cylindrical portion 43 of a diameter somewhat less than the diameter of portion 42. The junction between the portions 42 and 43 provide a shoulder 44 which normally engages the turned-in portion 16 of the plate 1 to prevent outward movement of the push button, and, at the same time, predetermine the position of the dome shaped portion 45 of the button with respect to the outer plane surface of the mounting plate. An annular disc 46 of insulating material is arranged within the confines of the cylindrical portion 42 of the button 6 and is normally held in engagement with the shoulder 44 by the expansible spring 7. This disc 46 is preferably provided with a circular aperture 47 and recesses 48 which are diametrically disposed and intersect the margin of aperture 47, as clearly shown in Figure 4. The actuator means 8 includes a substantially rectangular tongue portion 41, above referred to, which is normally held out of engagement with the trough formed by the diverging portions 40 of the contacts 9 and 10. The upper portion 49 of the actuator is preferably of a greater width than the tongue 41, and shoulders 50 are formed between the portions 41 and 49. The tongue 41 projects through the aperture 47 and the recesses 48 with the shoulders 50 engaging the upper surface of the insulating disc 46, as clearly shown in Figure 2 whereby to hold the actuator 8 in a predetermined position substantially perpendicular to the disc 46. The portion 49 is provided with a rounded surface 51 which engages the inner surface of the curved portion 45 of the push button 6 as clearly shown in Figures 2 and 3, so that the strain will be taken up by the push button and not by the disc 47 when the actuator encounters the resistance set up by the yieldable contacts 9 and 10 when the push button is pressed inwardly. If, for any reason whatever, the push button is pressed inwardly farther than is necessary, the aperture 47 in the disc 46 will provide clearance for the free diverging extremities 40 of the contacts 9 and 10.

A circular disc **52** of insulating material is held over and upon the inner extremities of the terminal posts **4** and **5** and the yieldable contacts **9** and **10** by the helical spring **7** to prevent the spring from coming into electrical engagement with either the posts or contacts. As clearly shown in Figure 3, the contacts **9** and **10** project through a central aperture **53** formed in the disc **52**. Hence, it is apparent that the spring **7** functions to urge the push button and parts associated therewith in one direction and the disc **52** in an opposite direction.

In order to predetermine the position of the actuator **8** on the push button **6** with respect to the yieldable contacts **9** and **10**, the side wall of the casing at some desirable location is preferably provided with a longitudinally extending depression **54** which projects inwardly into the casing, and the cylindrical portion **42** of the push button is preferably provided with a longitudinally extending groove **55** which slidably receives the depression **54** as clearly shown in Figure 3. Obviously, the positions of the depression and grooves could be reversed, and means other than those shown could be satisfactorily employed to prevent rotation of the button with respect to the switch casing. In order to prevent rotation of the actuating means carried by the push button, the periphery of the disc **46** is preferably provided with a notch **56** which is adapted to receive the base of the groove **55**.

Accordingly, it is apparent that I have provided a switch embodying improved principles of design and construction.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of the invention; and, therefore, I do not wish to be understood as limiting myself to the exact form, construction, arrangement, and combination of parts herein shown and described.

I claim:

1. An electric switch including, a casing, a carrier secured to and closing off one extremity of said casing, a hollow operating button mounted in the other extremity of said casing, a pair of elongated yieldable contacts normally engaging each other secured to said carrier, actuating means arranged substantially within said button, said actuating means including a disc and a member of insulating material projecting through said disc with one end engaging one end of said button and its other end extended to engage said contacts when said button is operated, and resilient means normally pressing said disc and said end of said member against said button.

2. An electric switch including, a casing, a contact carrier carrying contacts secured to said casing, a hollow operating button mounted on said casing, actuating means arranged in said button, said means including a disc provided with an aperture and notches intersecting the margin of said aperture, and a member projecting through said aperture and said notches and having a part engaging said button and a part extended for engagement with said contacts when the button is pressed inwardly, the aperture in said disc providing clearance for said contacts when said button is pressed inwardly to an extent farther than is necessary.

3. A hollow push button for an electric switch, a disc arranged in said button, an aperture in said disc, and an actuating member extending through said aperture and having an enlargement overlying one side of said disc, and normally engaging said button, said aperture and said member constructed and arranged to position said member axially in said button.

4. A hollow push button for an electric switch, said button having a small extremity and a large extremity joined by a shoulder, a disc arranged in said large extremity and engaging said shoulder, an aperture provided in said disc and notches intersecting said aperture, a member extending through said aperture and through said notches with a portion abutting a surface of said disc, said member also having a portion engaging one end of said small extremity and another portion extended for cooperation with switching mechanism.

5. An operating member for an electric switch, said member having an abutment, a disc engaging said abutment, an aperture provided in said disc and notches intersecting said aperture, an element extending through said aperture and through said notches with a portion abutting a surface of said disc, and a portion extending from the other surface of the disc for cooperation with switching mechanism.

6. A hollow push button for an electric switch, said button having a small extremity and a large extremity joined by a shoulder, a disc arranged in said large extremity and engaging said shoulder, an aperture provided in said disc and a notch intersecting said aperture, a member extending through said aperture and through said notch with a portion abutting a portion of said disc, said member also having a portion extended for cooperation with switching mechanism.

7. A mounting plate provided with a protuberance, a switch casing having an integral end wall, an aperture provided in said end wall receiving said protuberance with portions of the protuberance being flanged over and upon the inner surface of said end wall, a contact carrier carrying contacts mounted on said casing, operating means for controlling the operation of the circuit between said contacts having a portion slidably arranged in said protuberance and a portion slidably arranged in said casing, and resilient means acting to normally press a part of the portion of the operating means within the casing against the flanged over portion of said protuberance.

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